

FIG. 1A
(PRIOR ART)

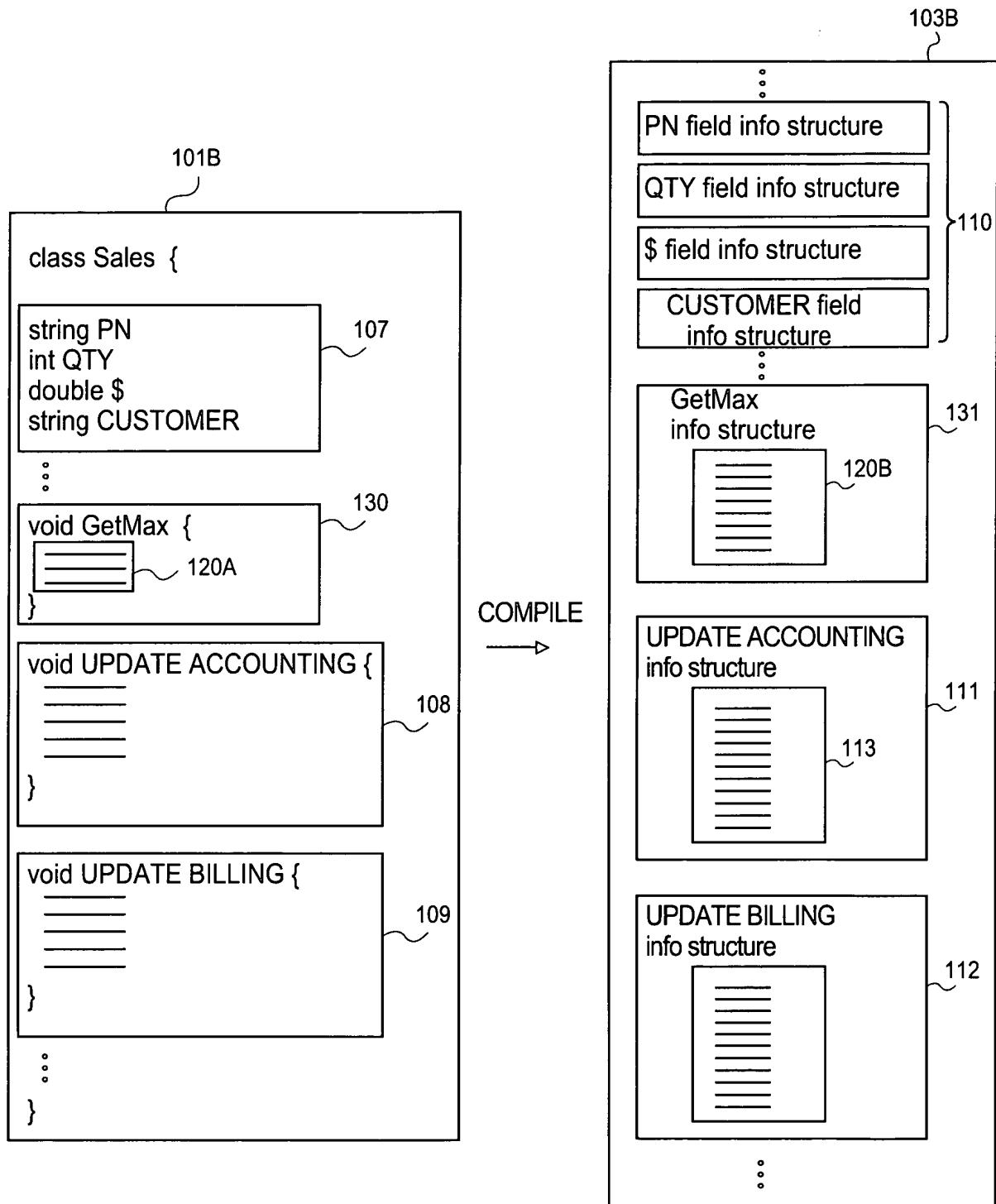


FIG. 1B
(PRIOR ART)

“GetMax”
source code text:

120A

```
if (a > b) {  
    return a;  
} else {  
    return b;  
}
```

COMPILE
→

“GetMax”
equivalent byte code:

120B

```
iload_0  
iload_1  
icmp  
iFeq L_0  
iload_0  
ireturn  
L0: iload_1  
ireturn
```

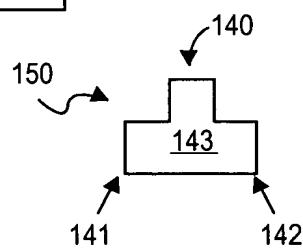


FIG. 1C
(PRIOR ART)

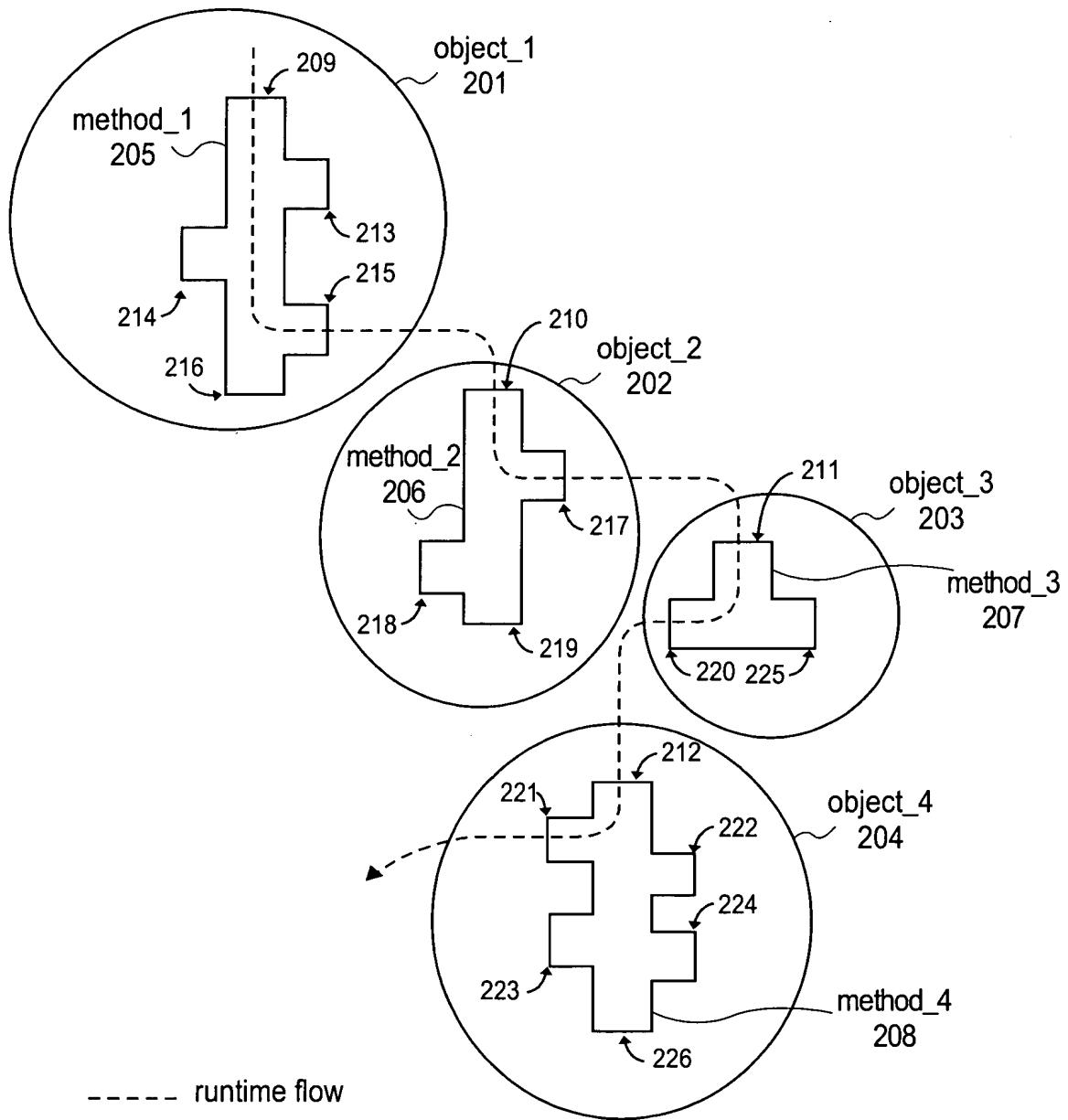


FIG. 1D
(PRIOR ART)

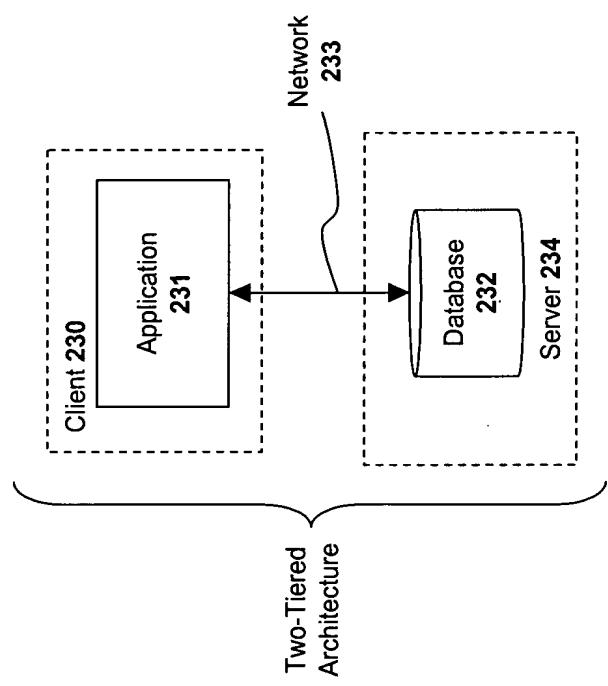


FIG. 2A
(prior art)

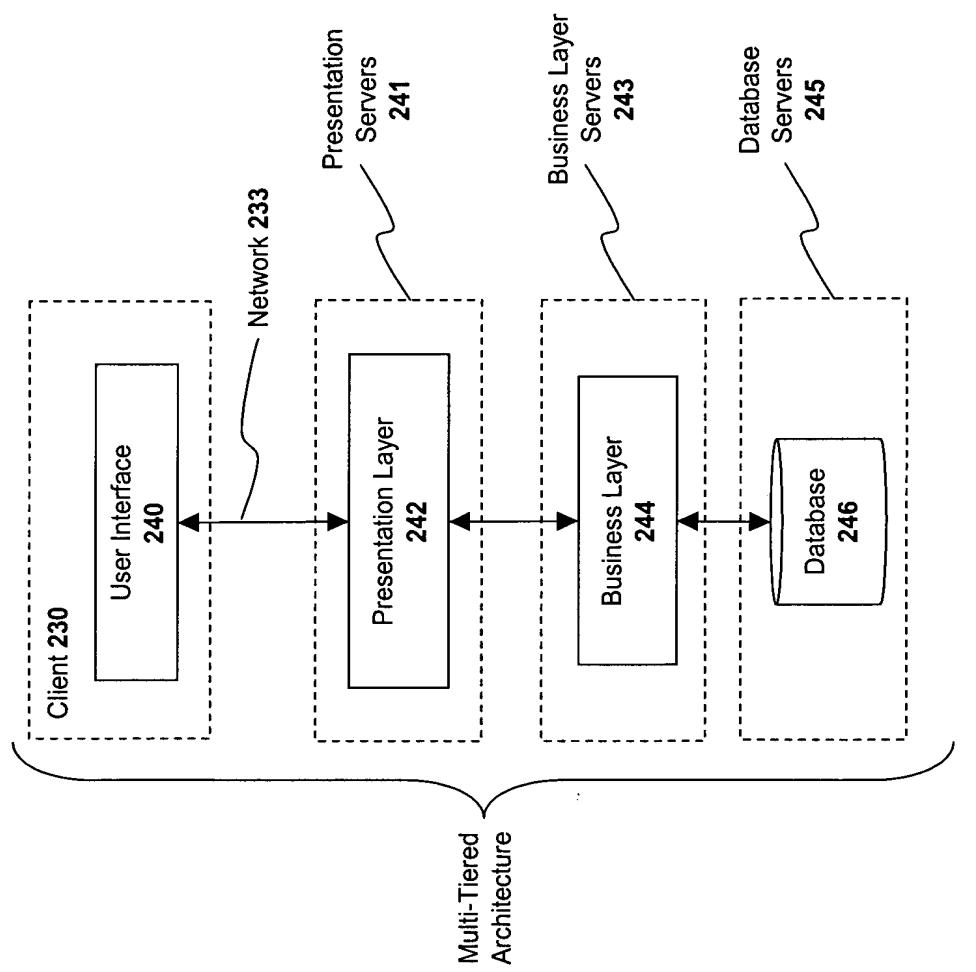


FIG. 2B
(prior art)

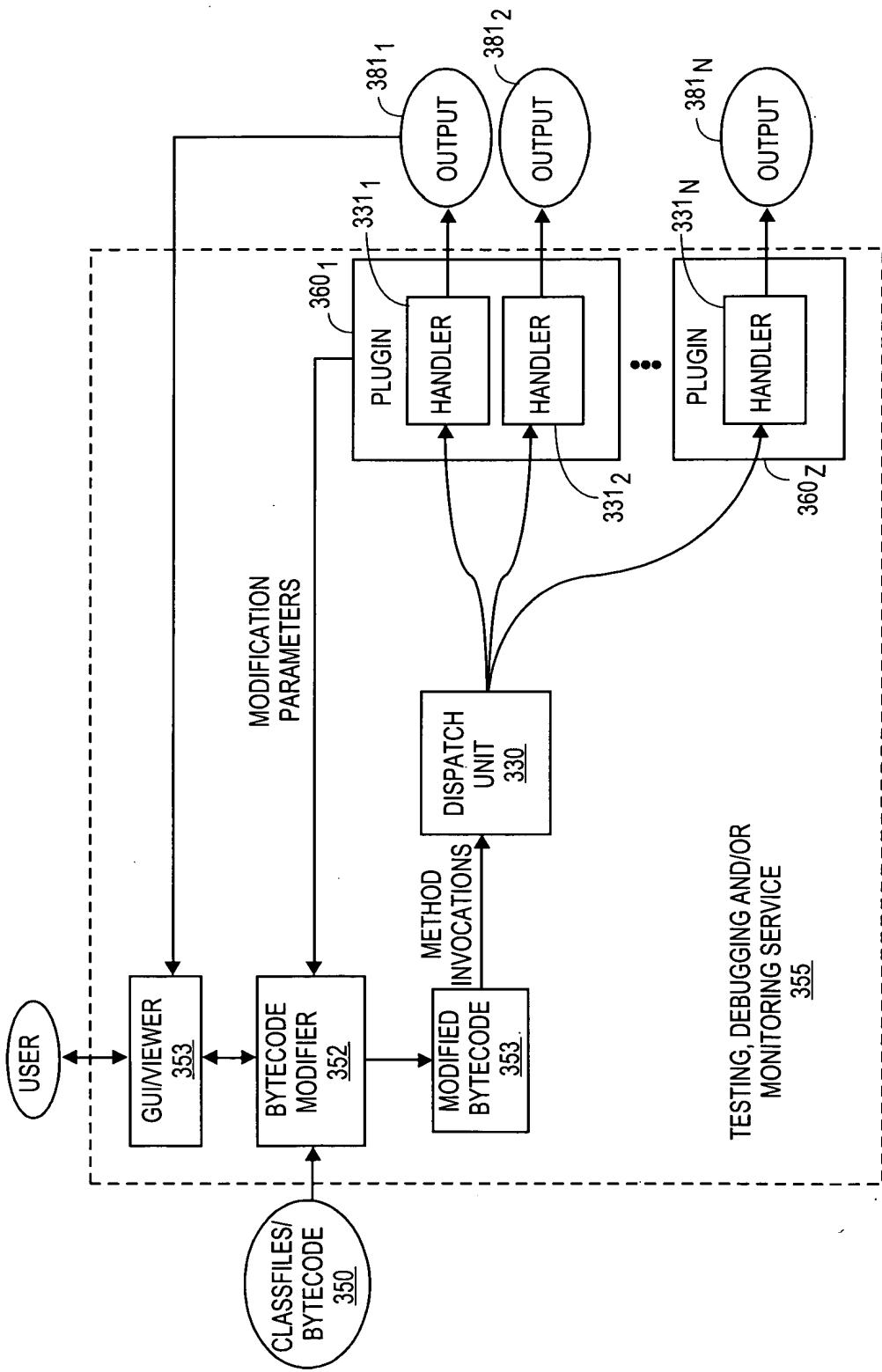


FIG. 3

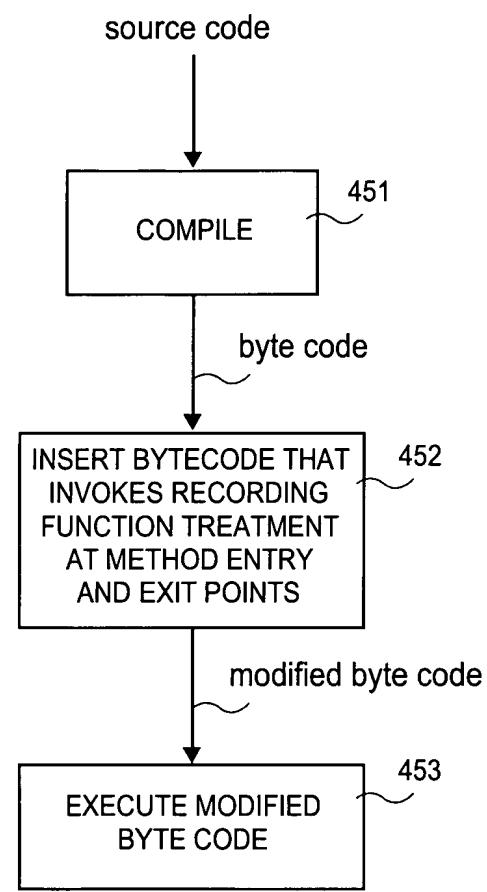


FIG. 4A

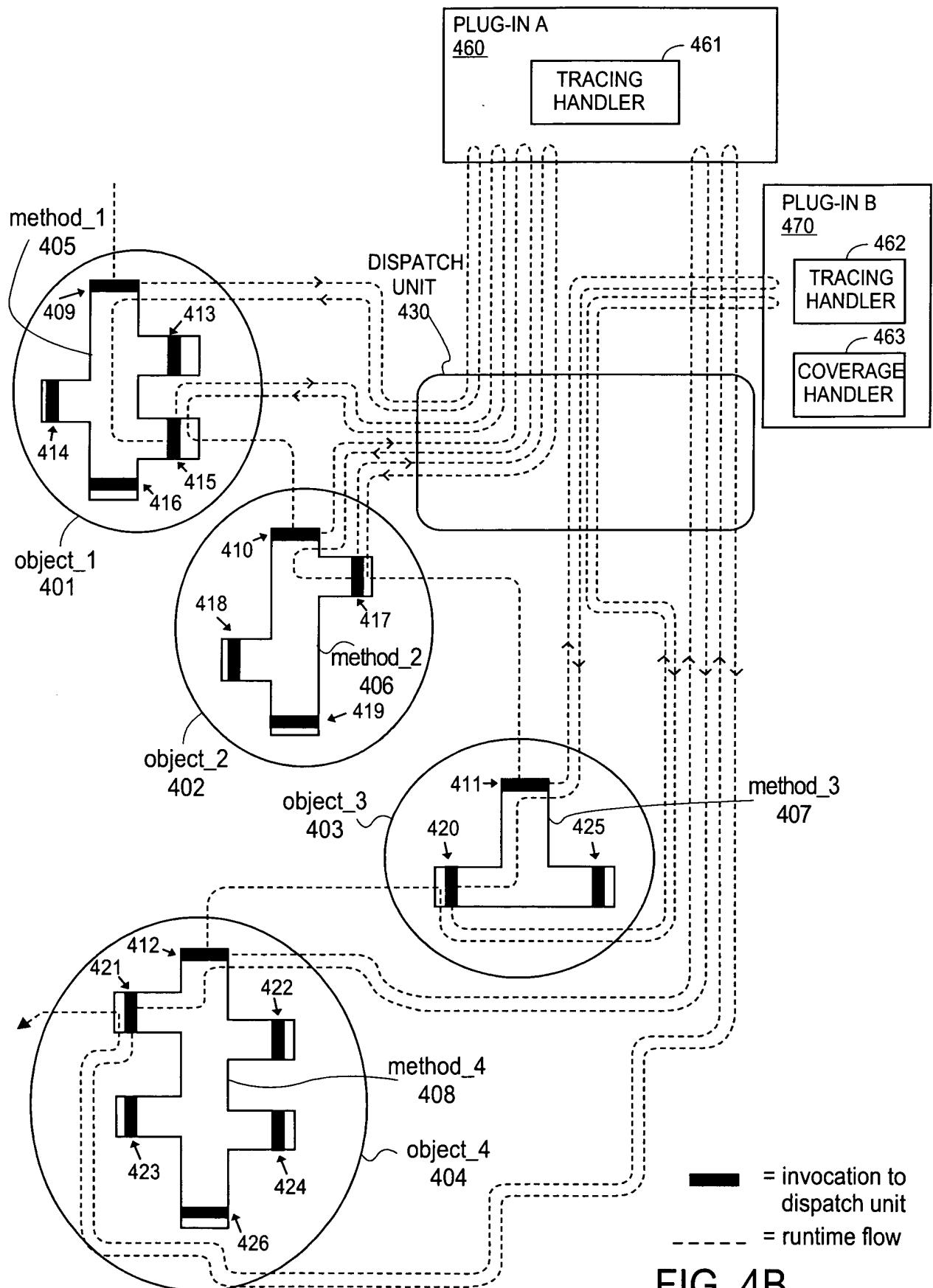


FIG. 4B

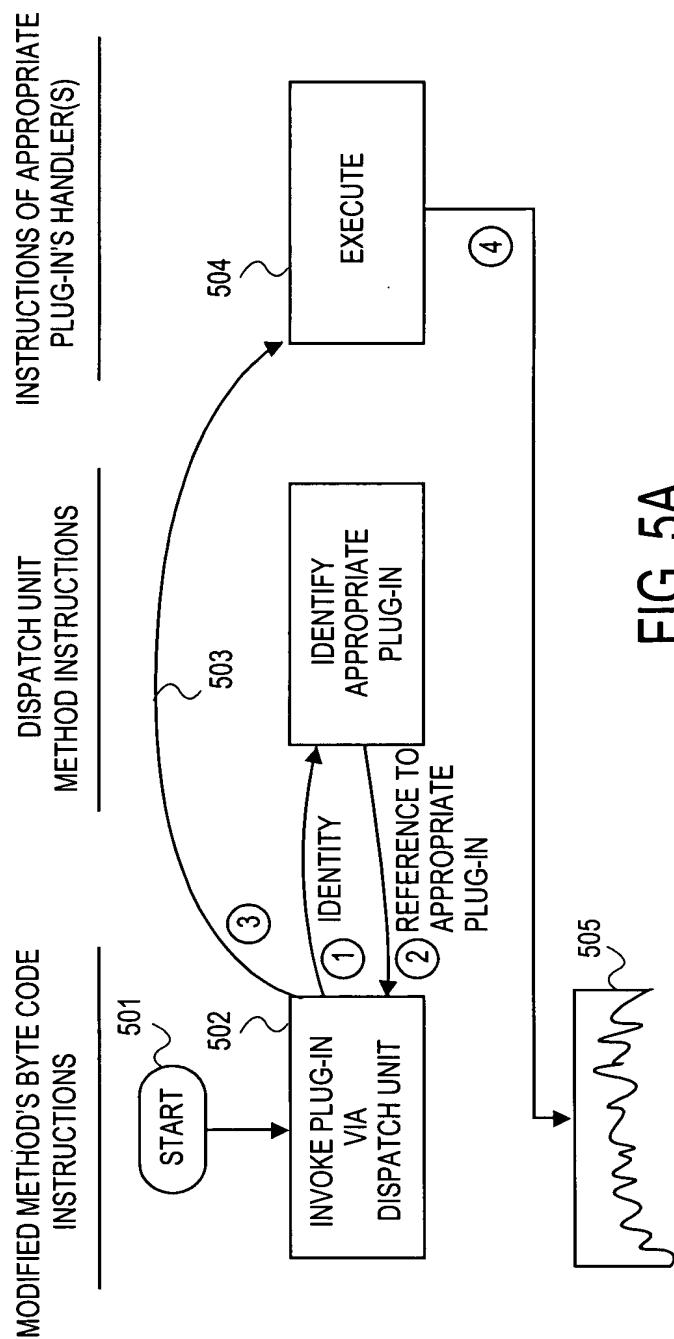


FIG. 5A

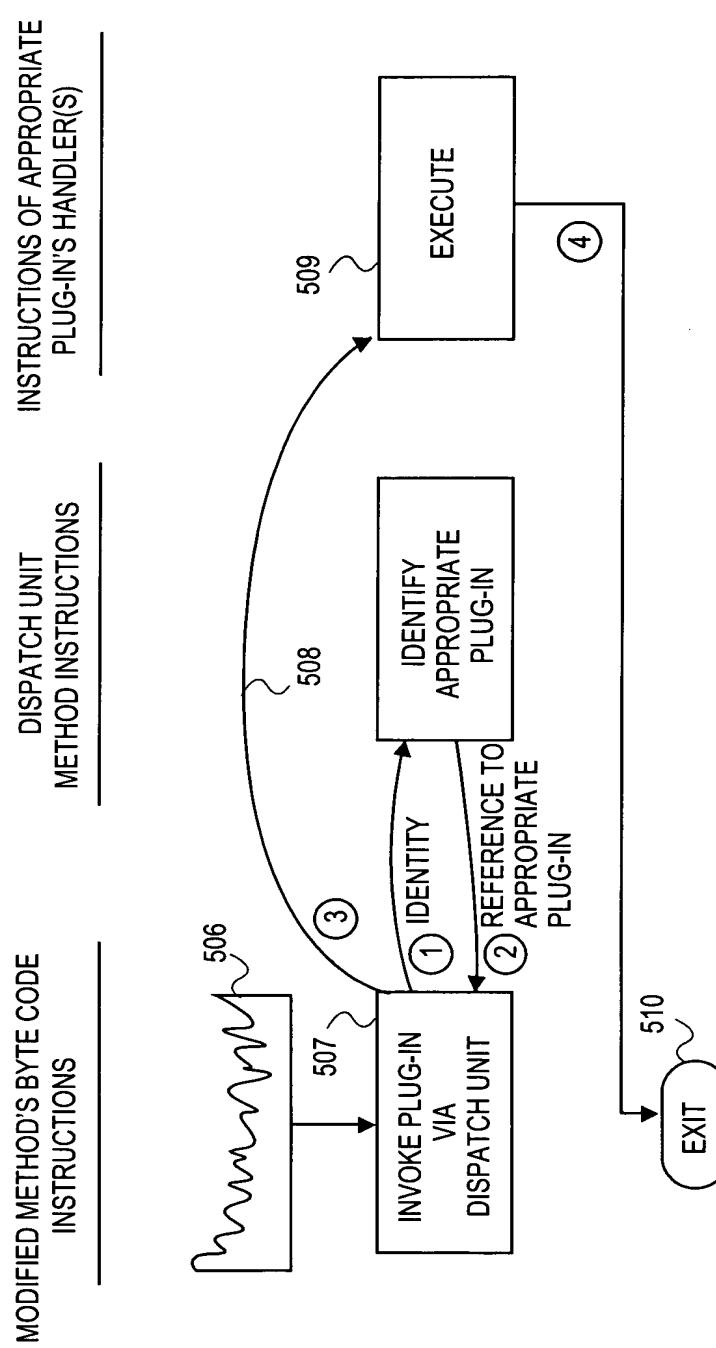


FIG. 5B

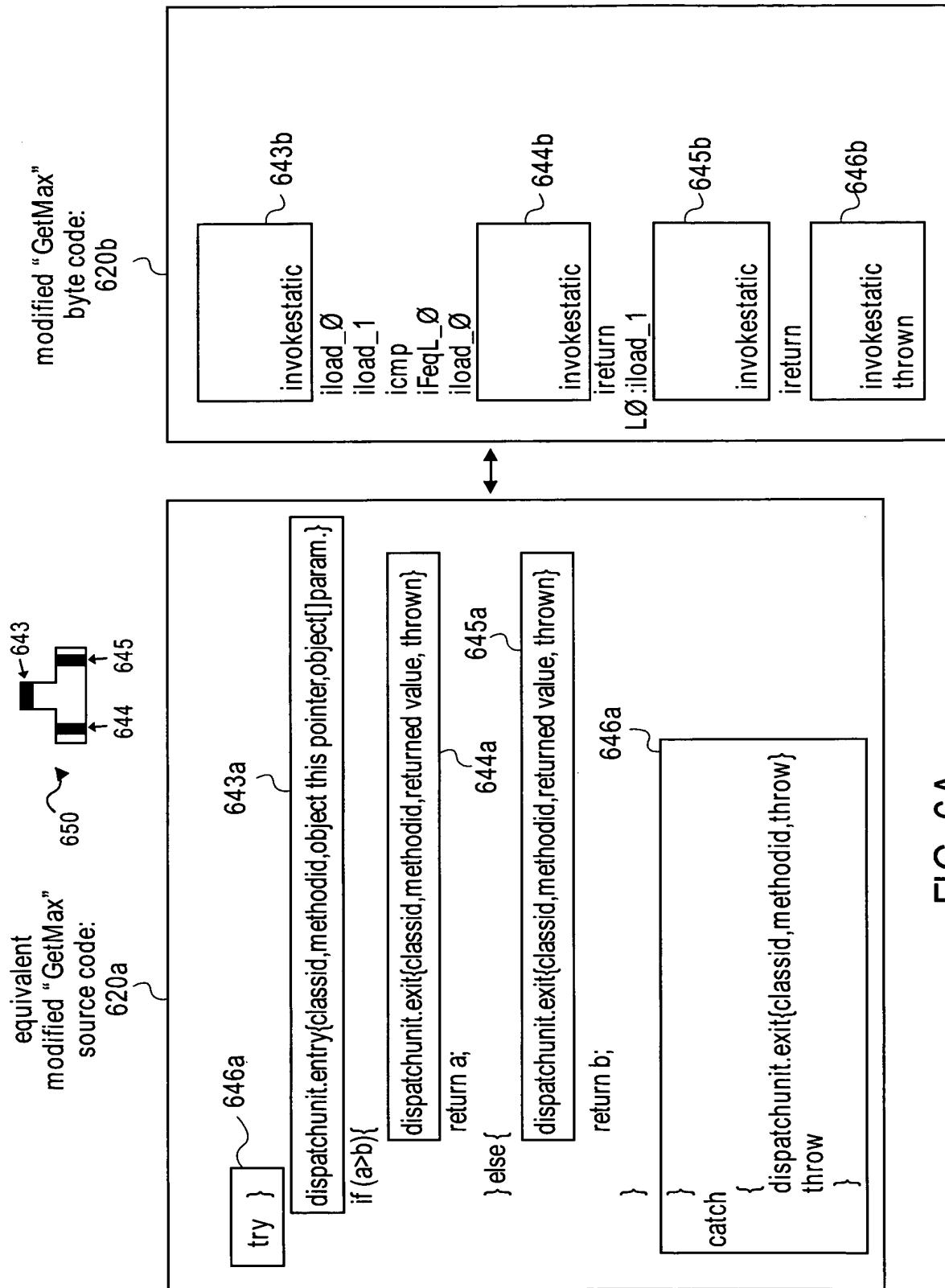


FIG. 6A

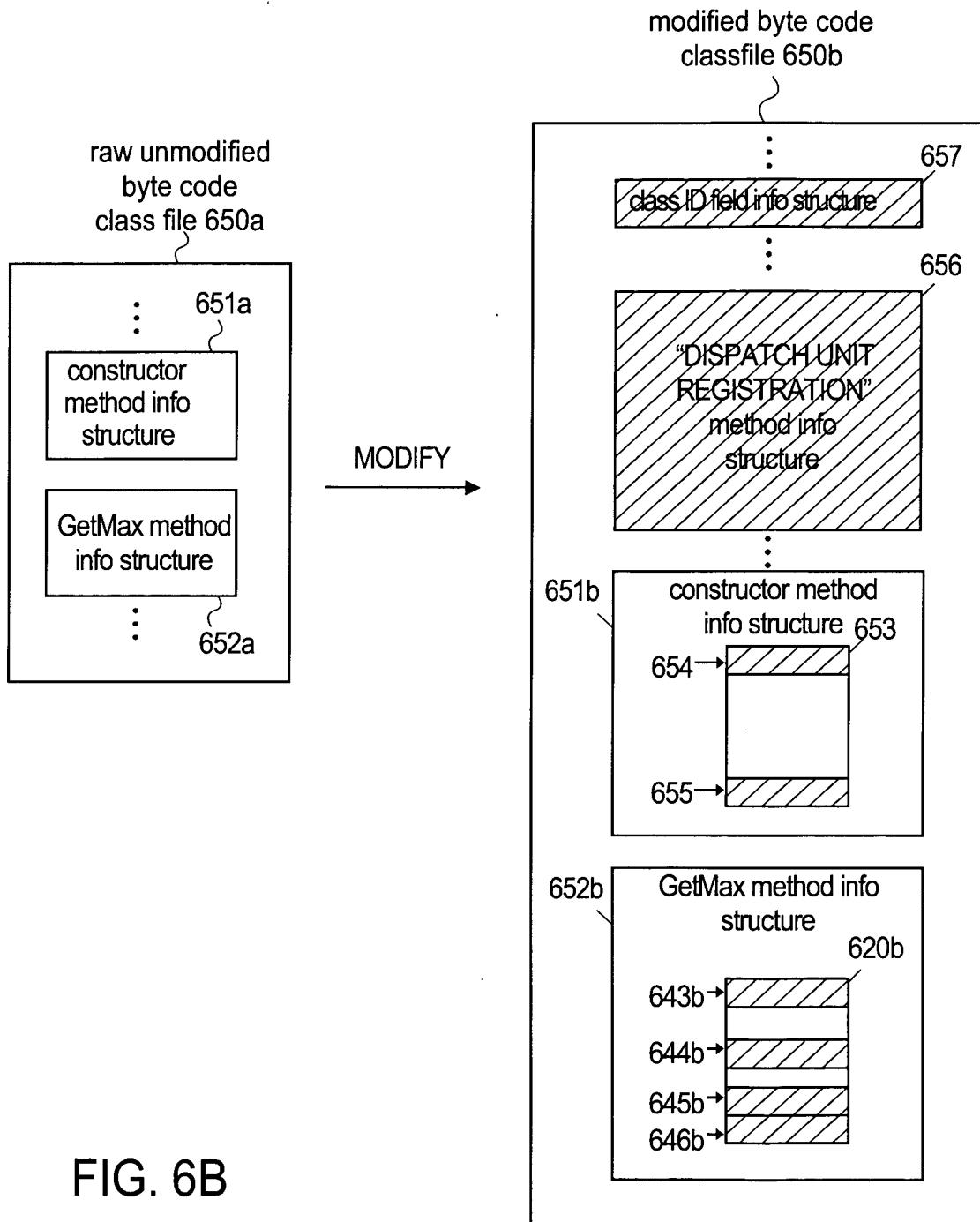


FIG. 6B

▀ = inserted matter

701

	INVOKING METHOD	PLUG IN MODULE
(method_1)	C ₁ , M ₁ , args 11	PIM_A
(method_2)	C ₁ , M ₂ , args 12	PIM_A
(method_3)	C ₂ , M ₁ , args 21	PIM_B
(method_4)	C ₃ , M ₁ , args 31	PIM_A

FIG. 7

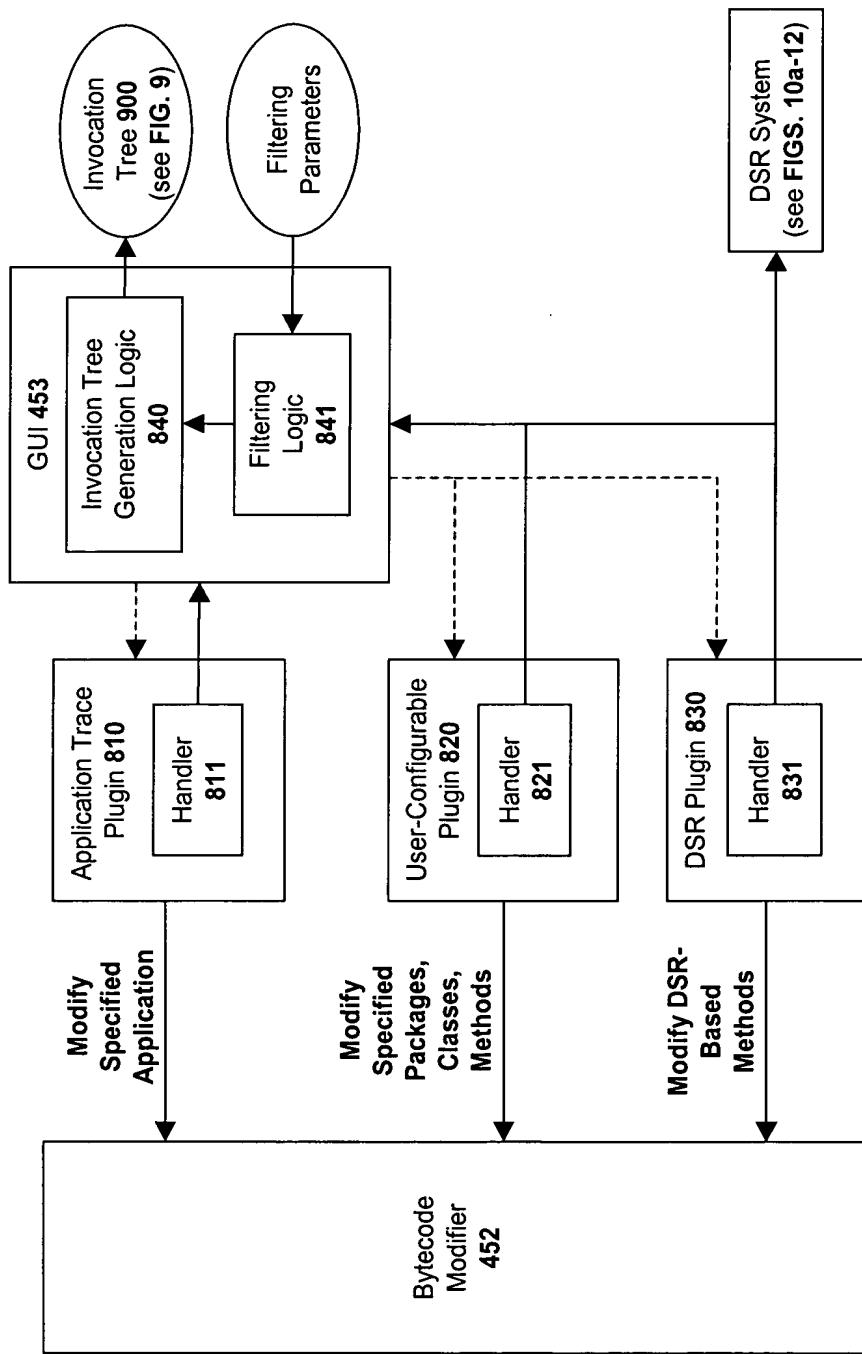


FIG. 8

Invocation Tree
900

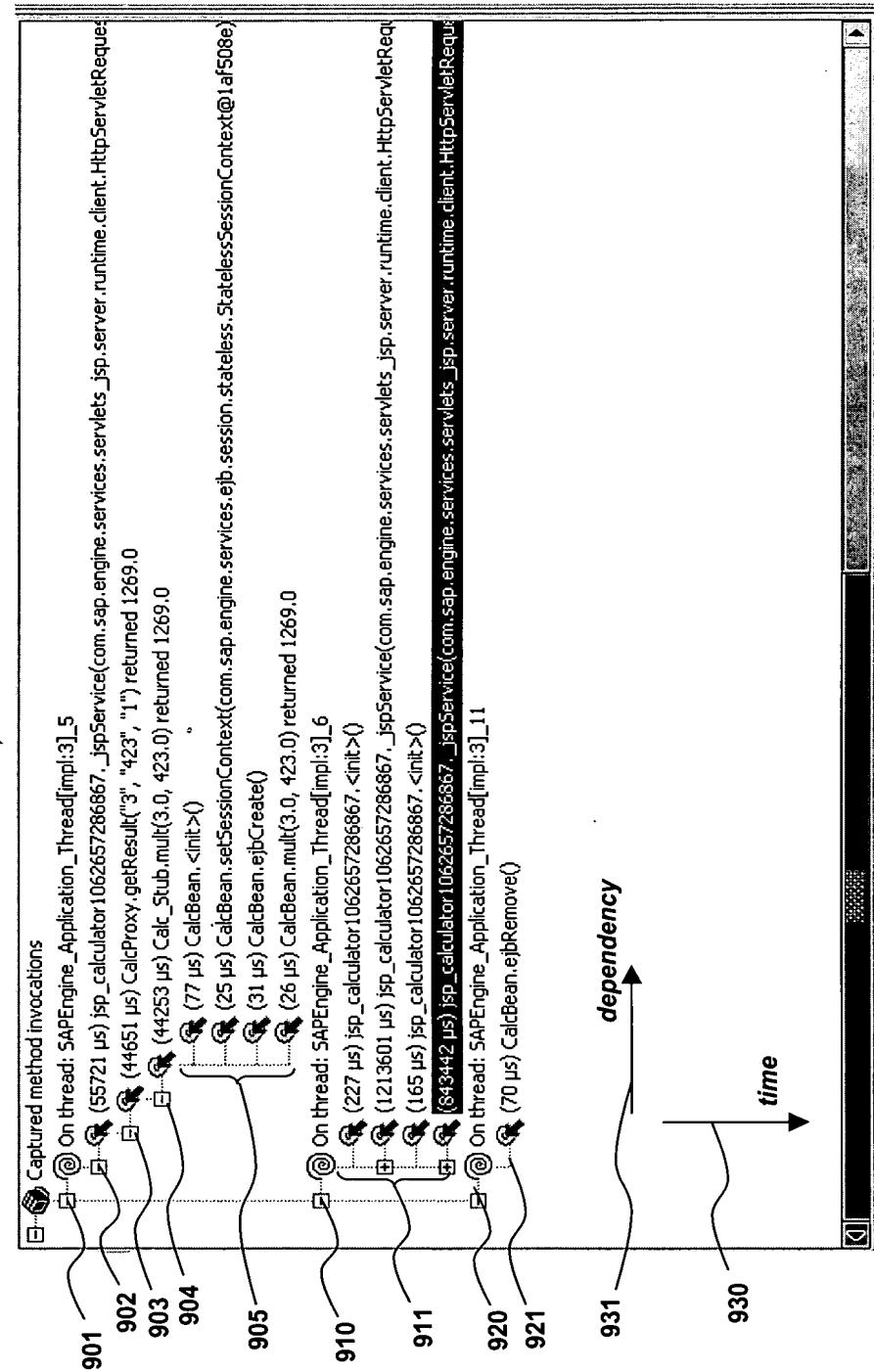
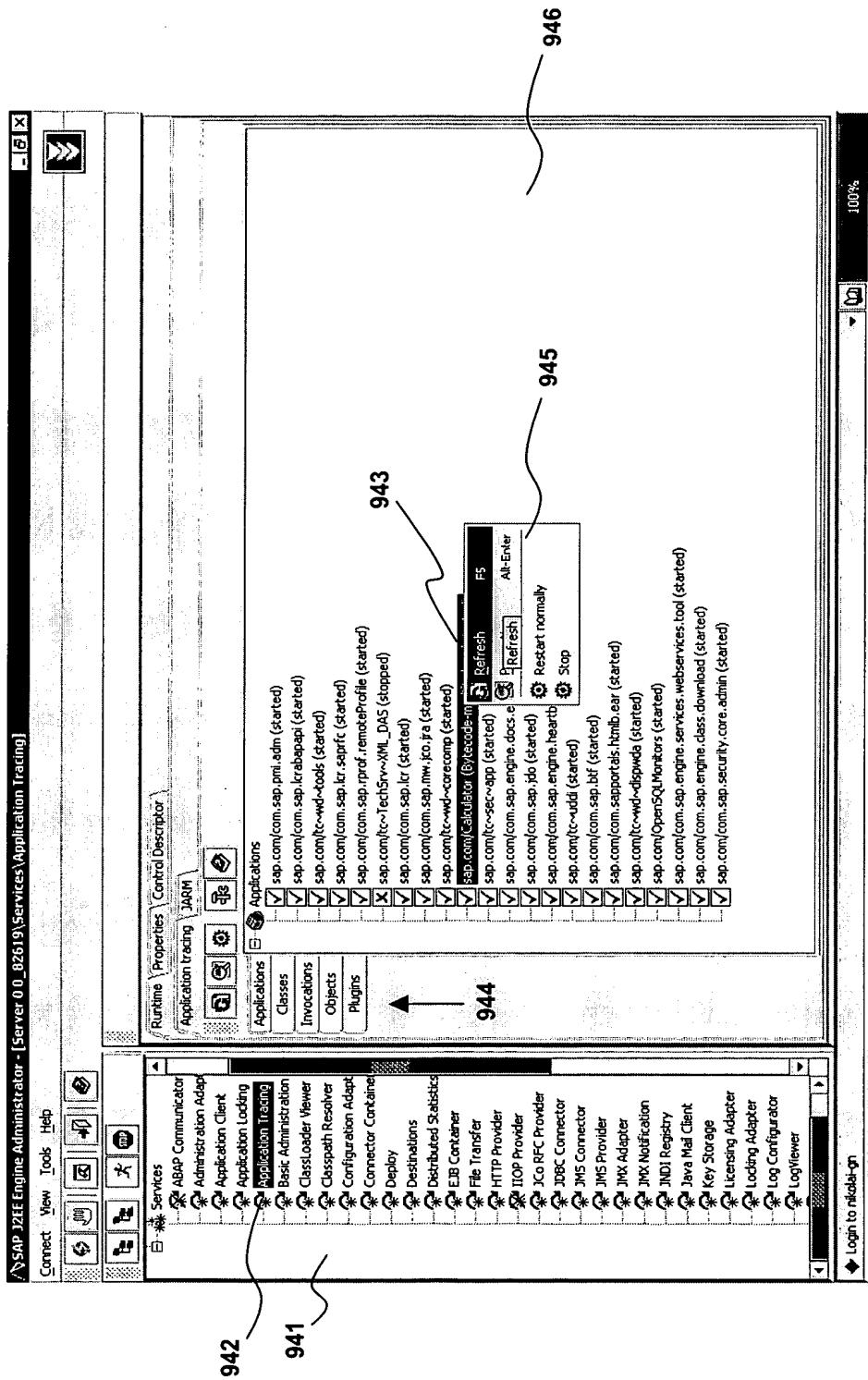


FIG. 9A



EIG 98

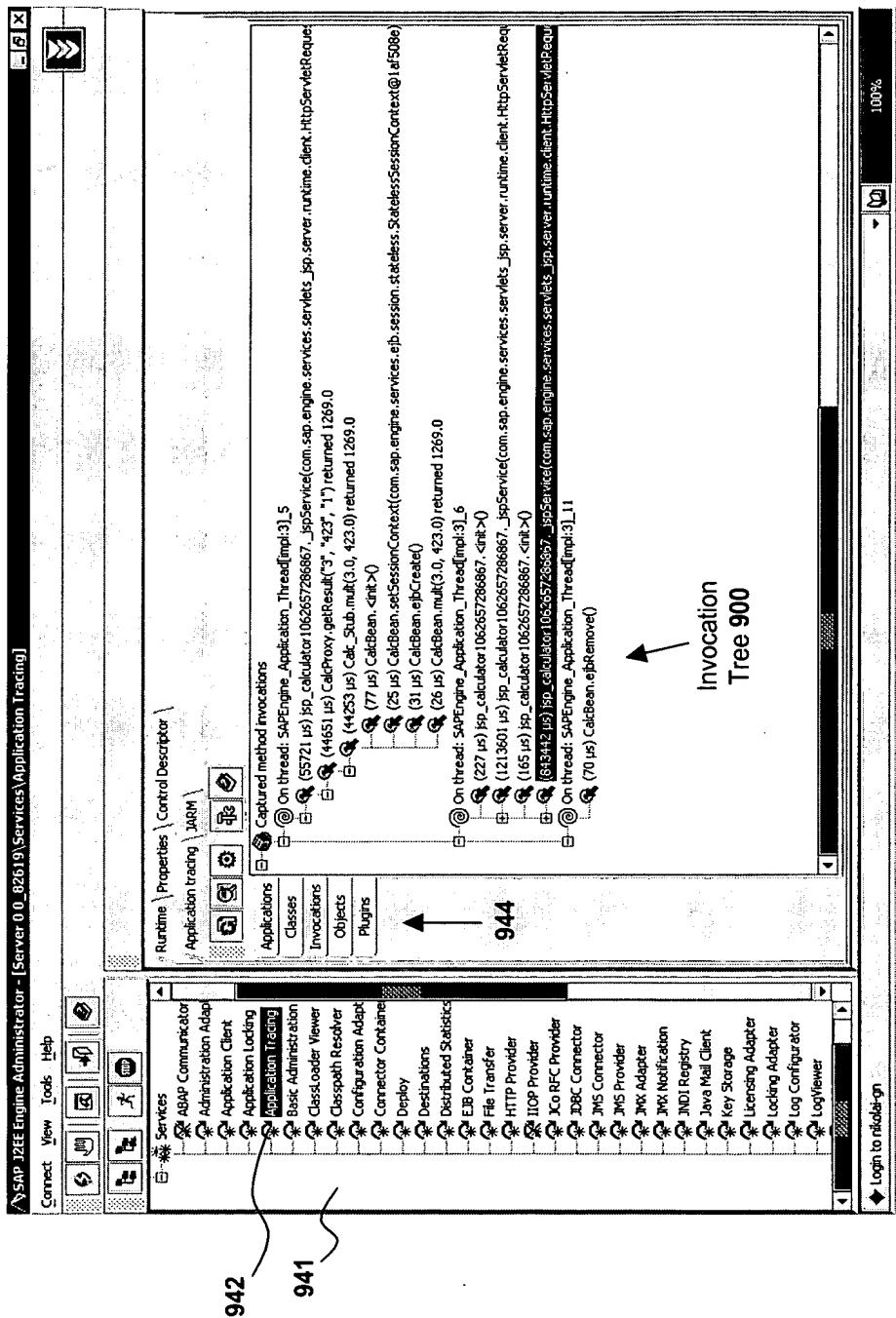


FIG. 9C

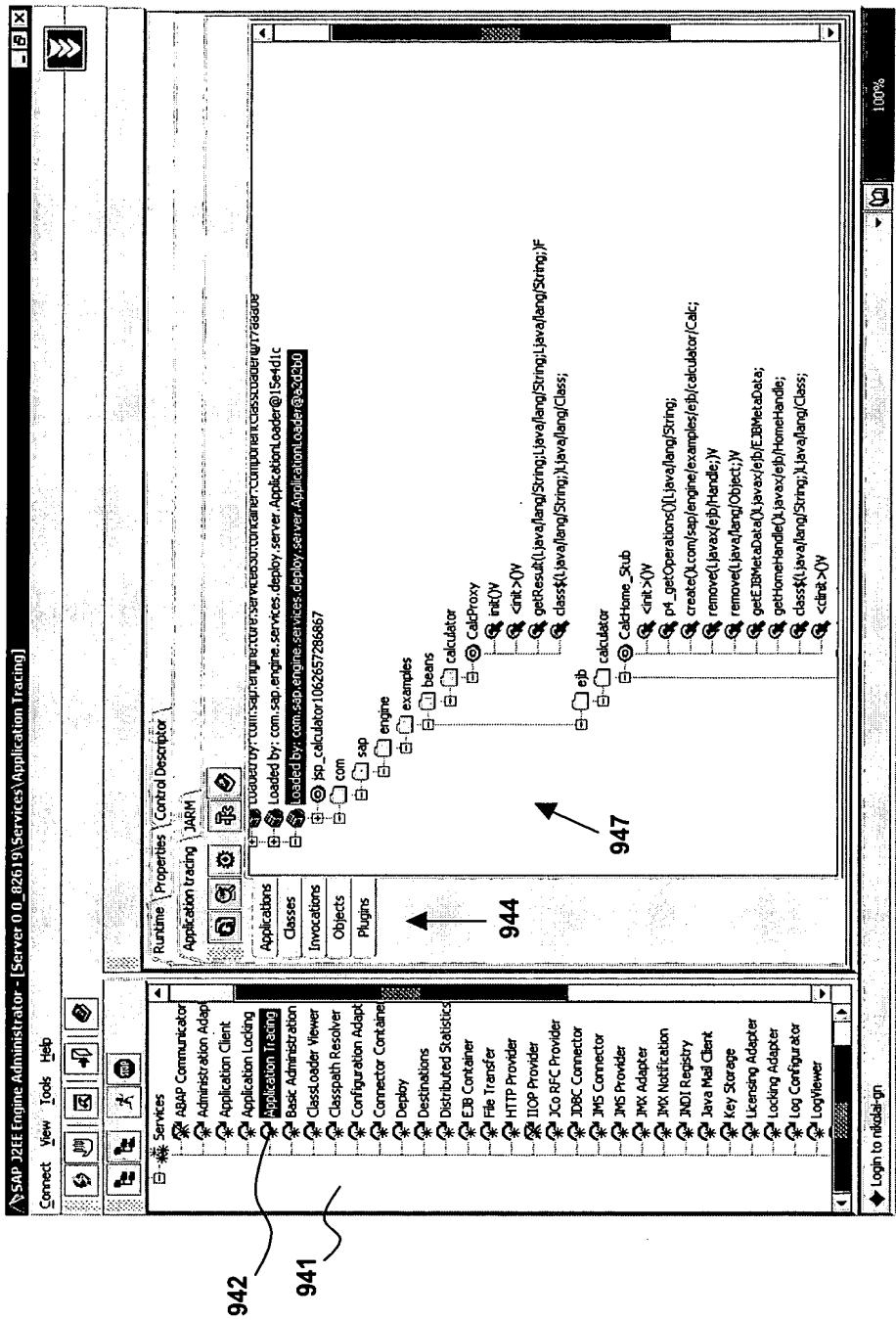


FIG. 9D

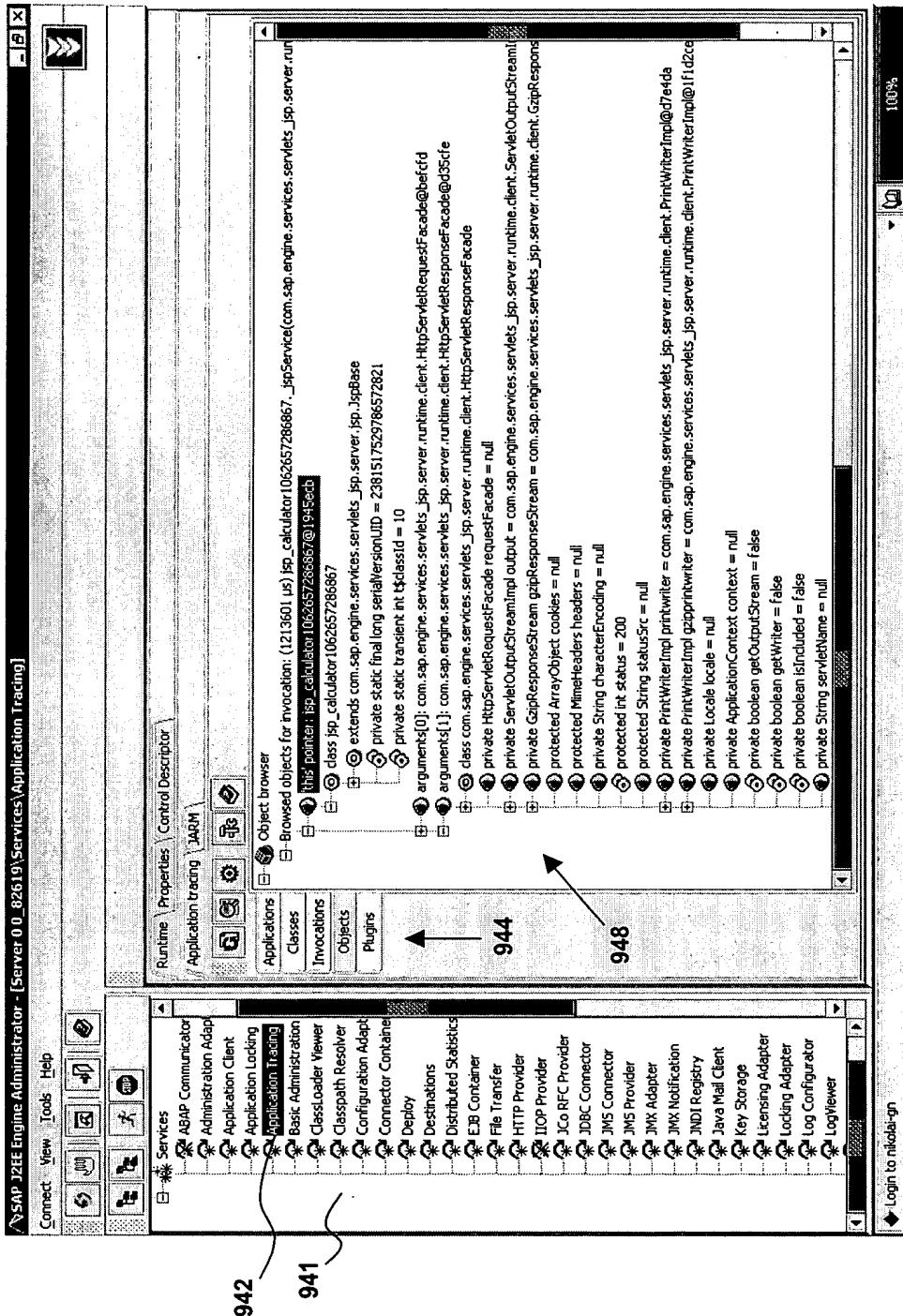


FIG. 9E

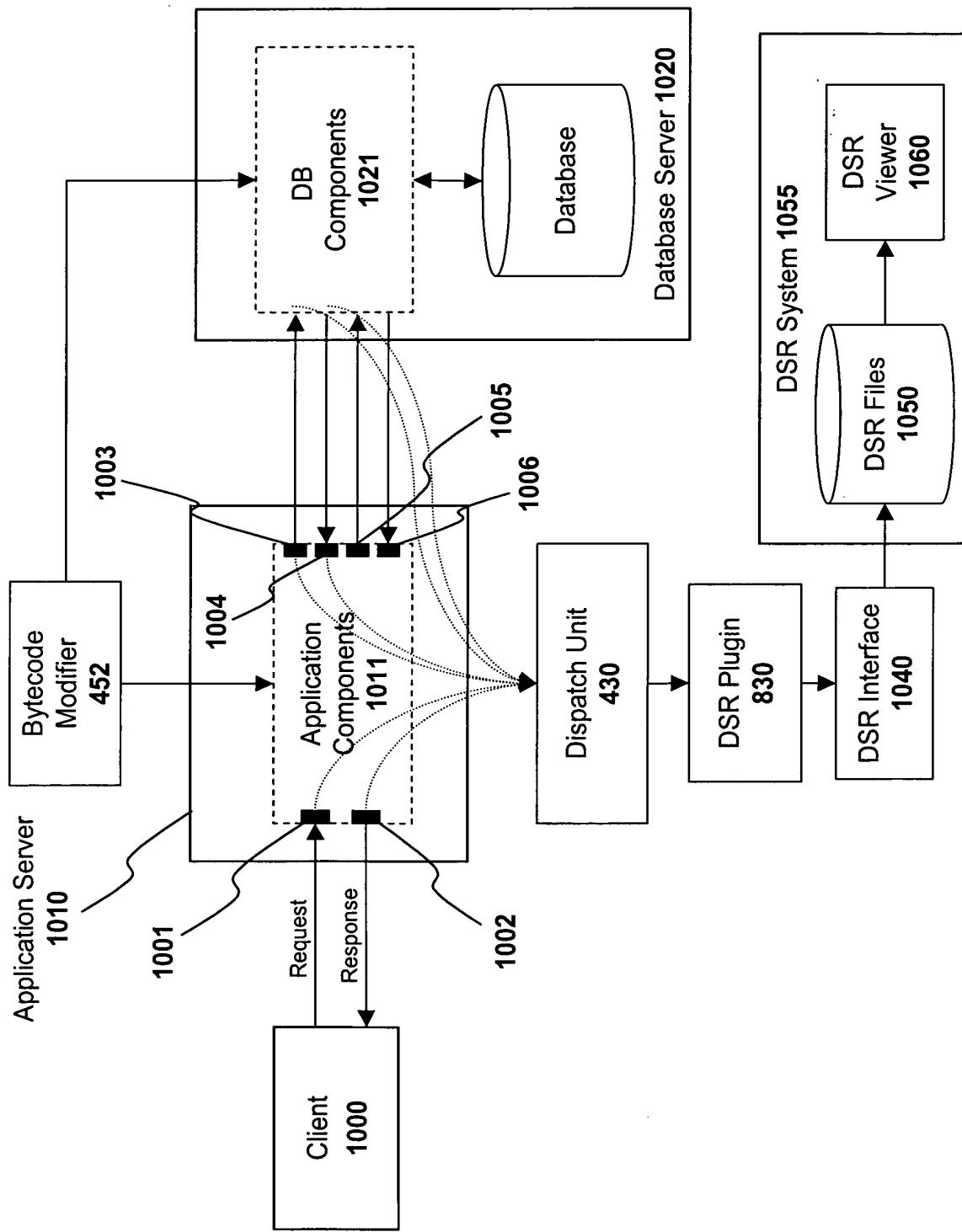


FIG. 10A

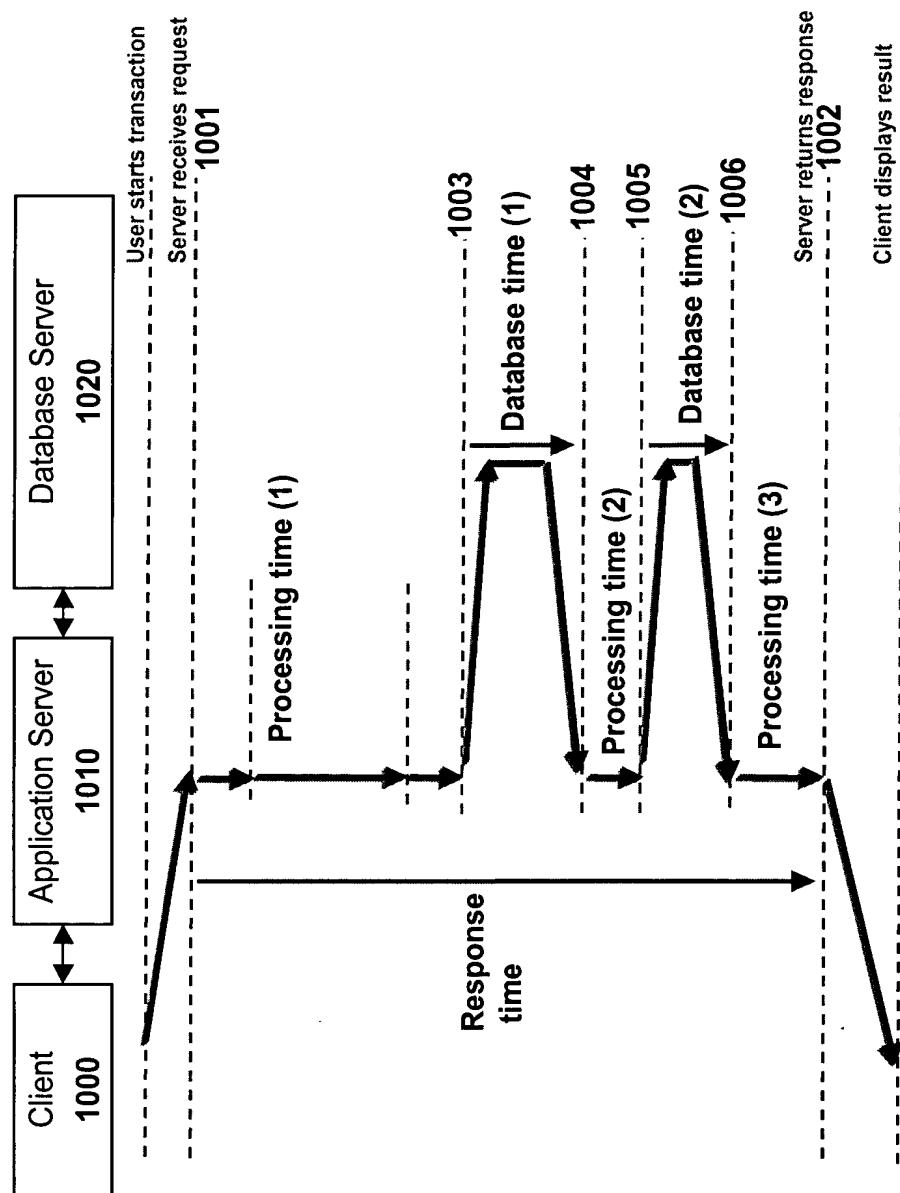


FIG. 10B

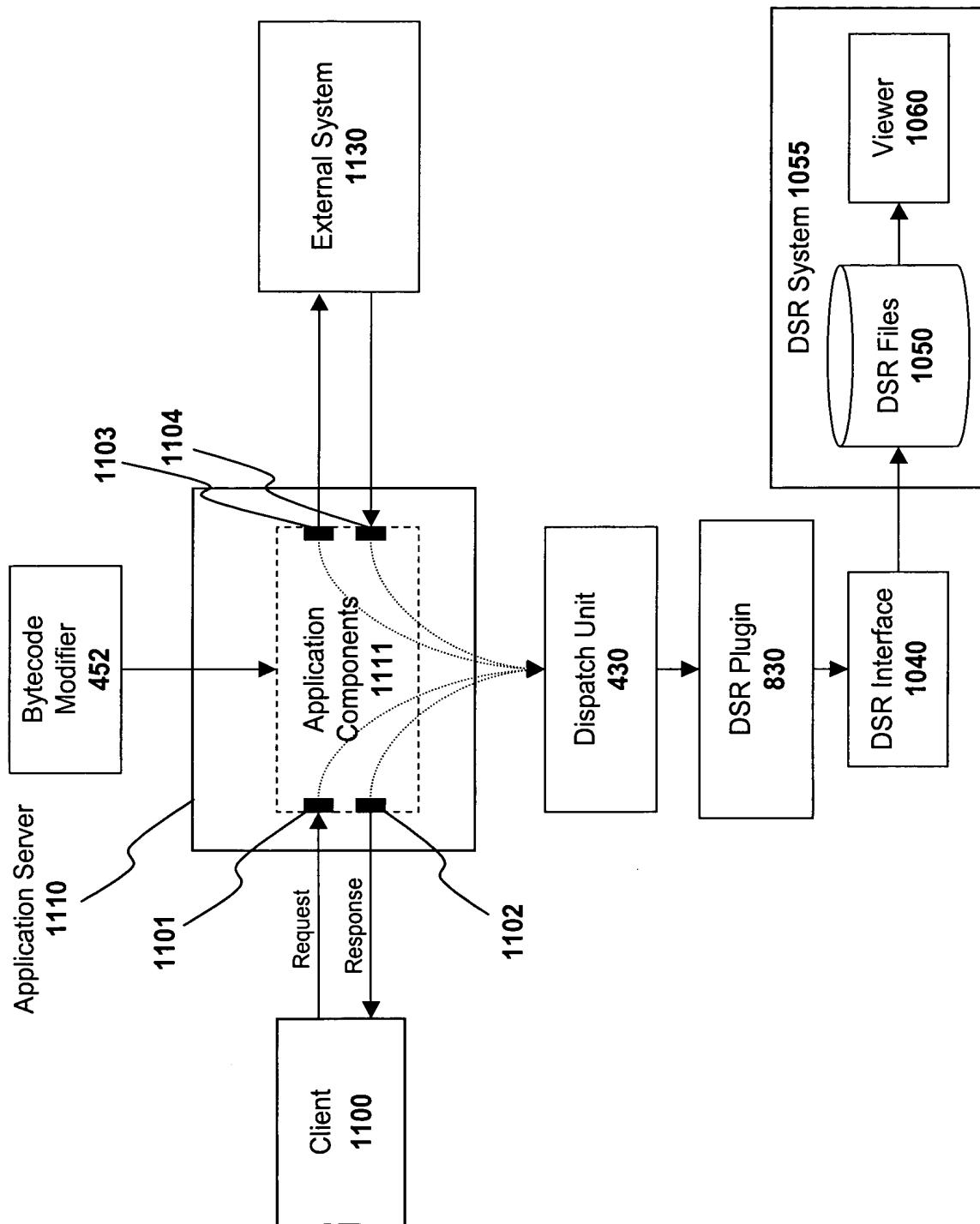


FIG. 11A

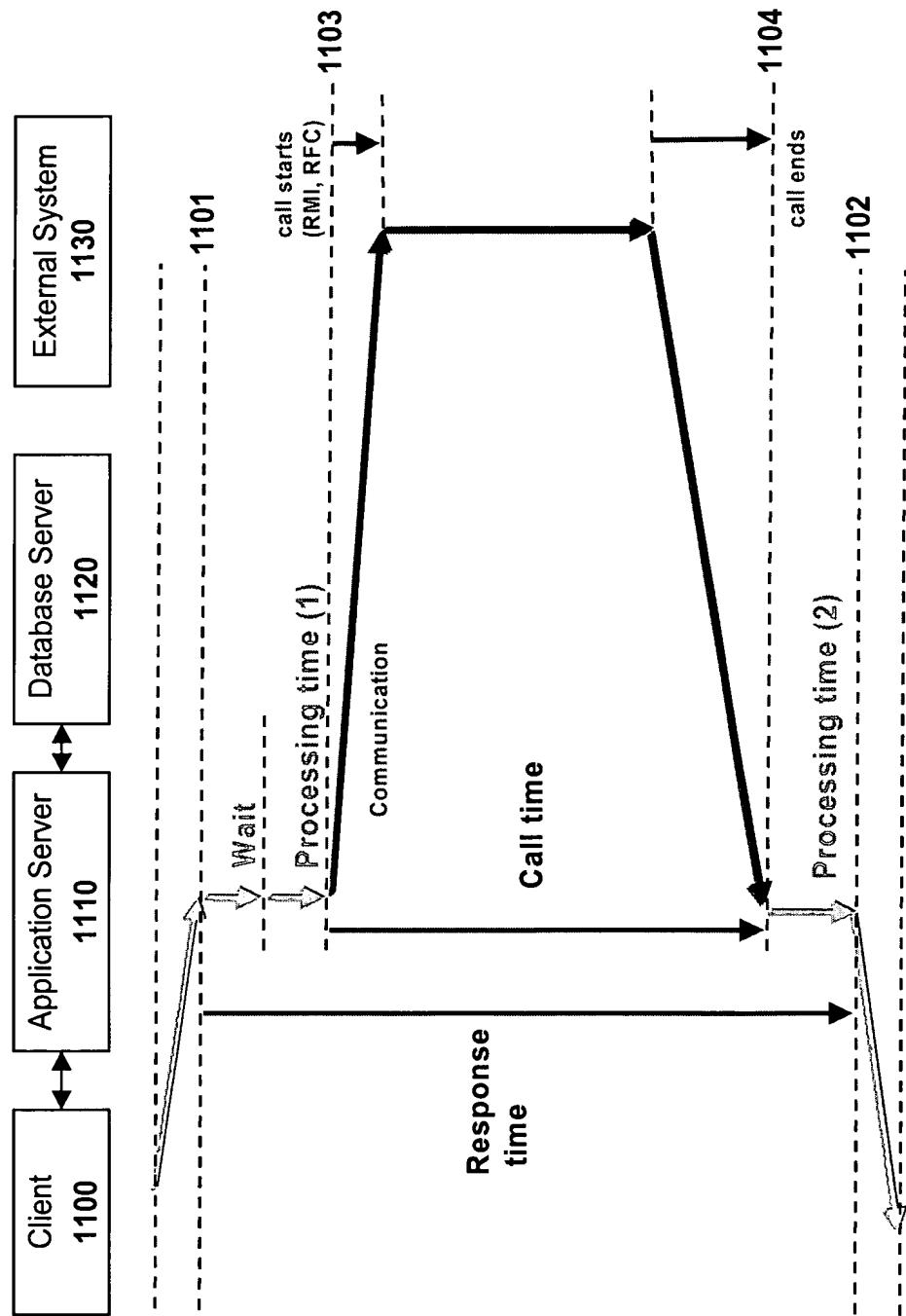


FIG. 11B

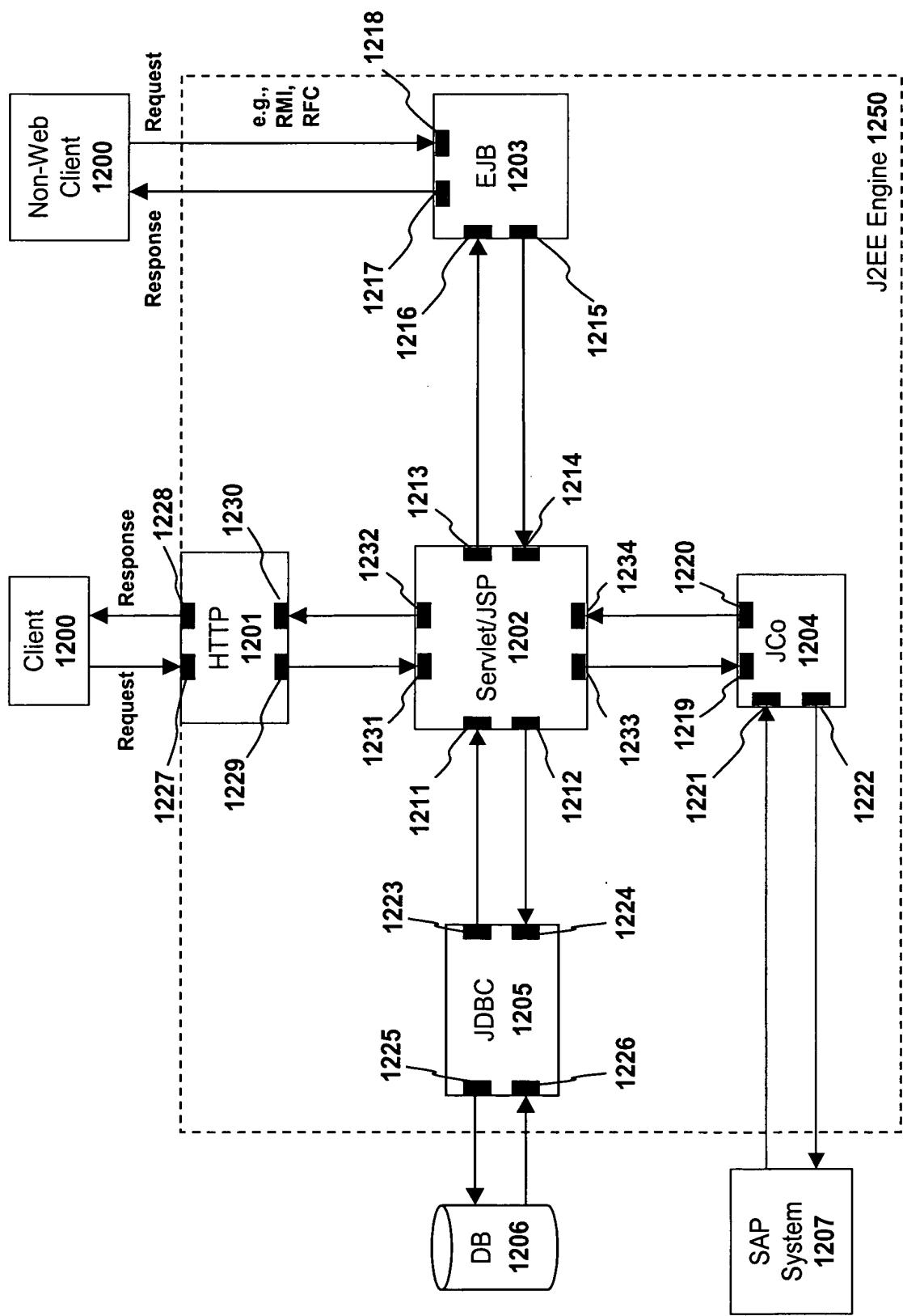


FIG. 12

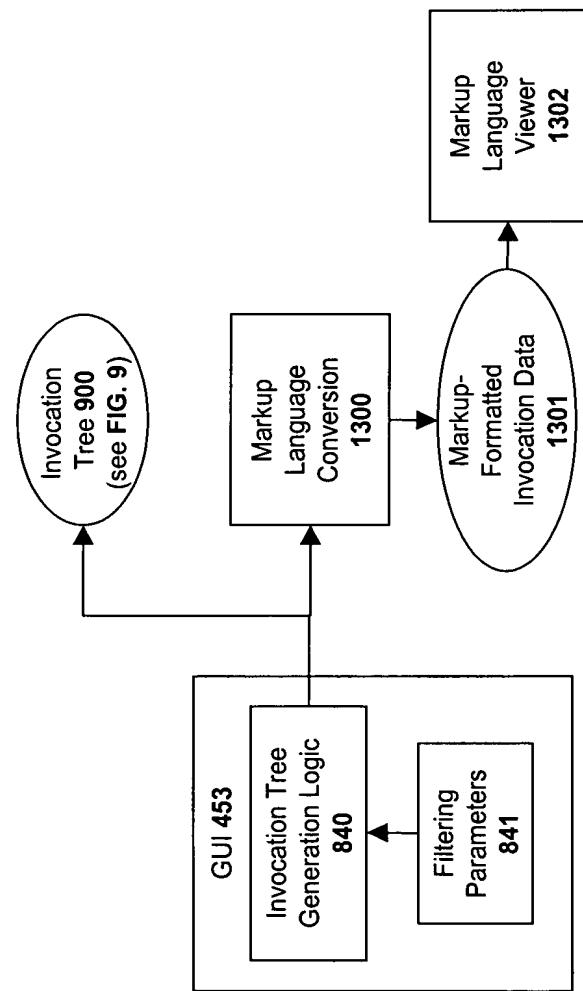


FIG. 13

FOR EACH CLASSFILE HAVING
A METHOD TO BE MODIFIED:

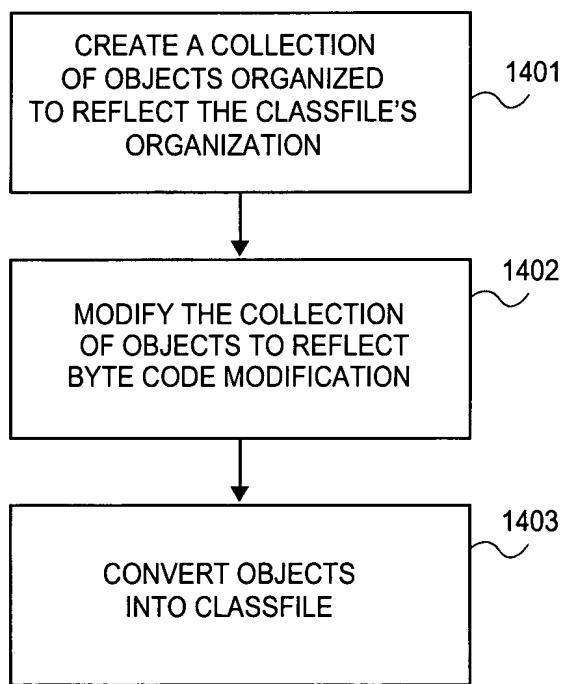


FIG. 14

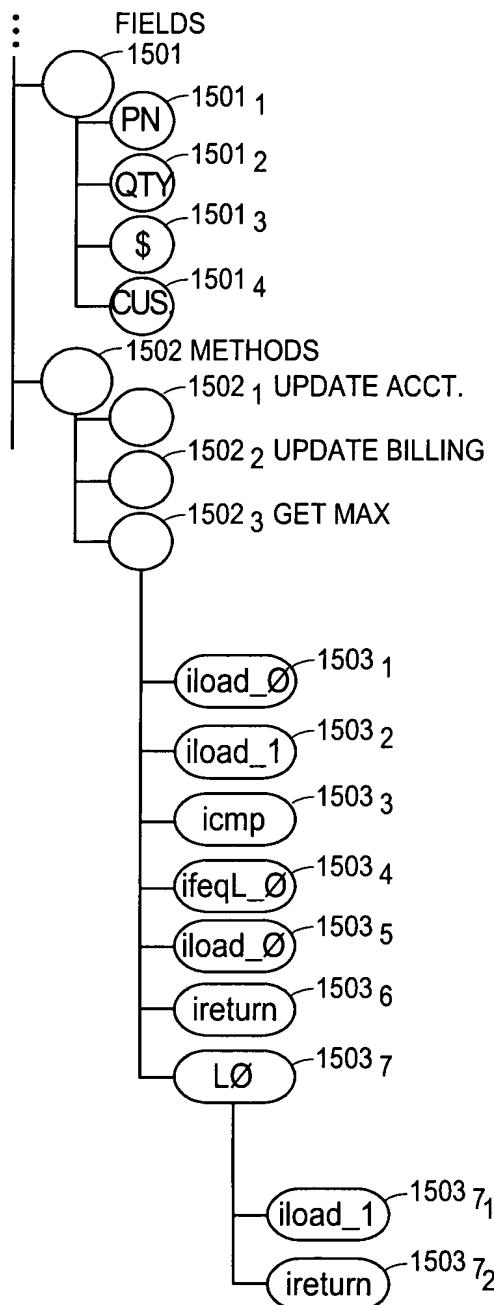


FIG. 15A

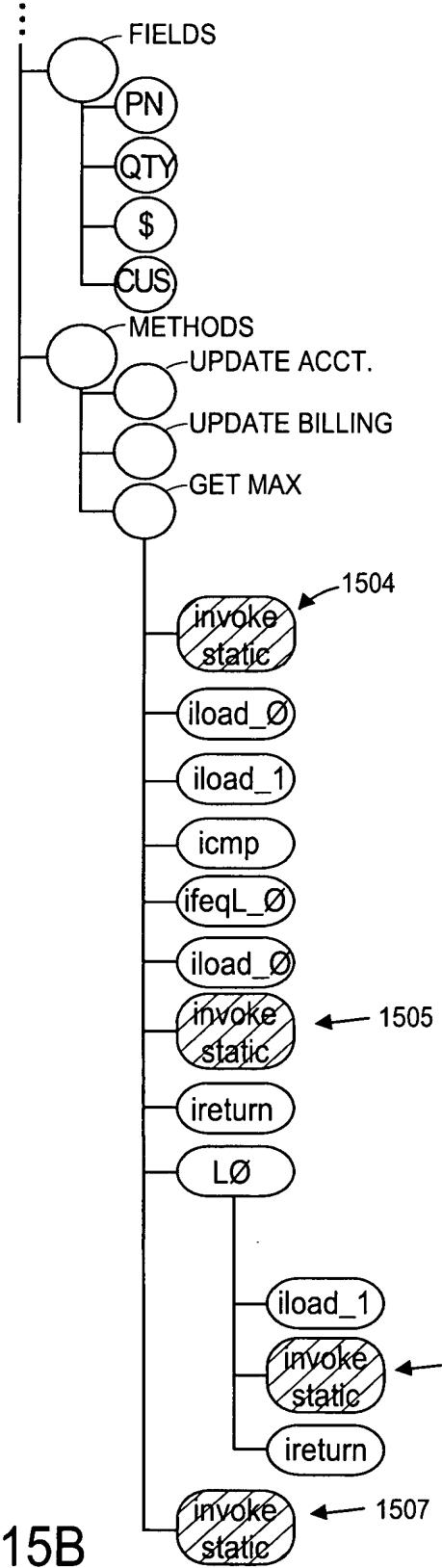


FIG. 15B

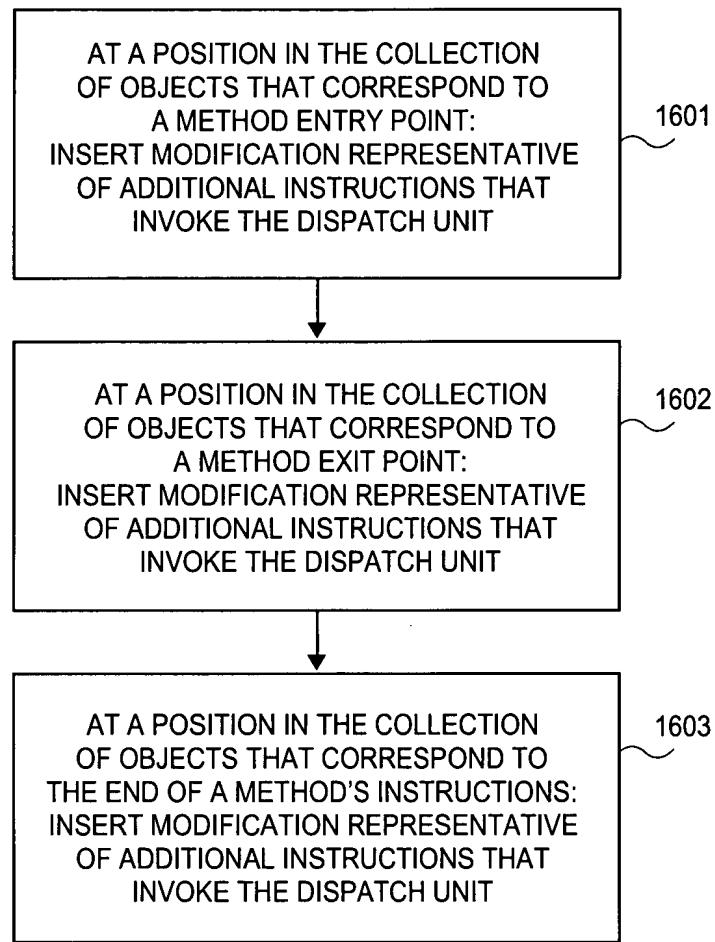


FIG. 16

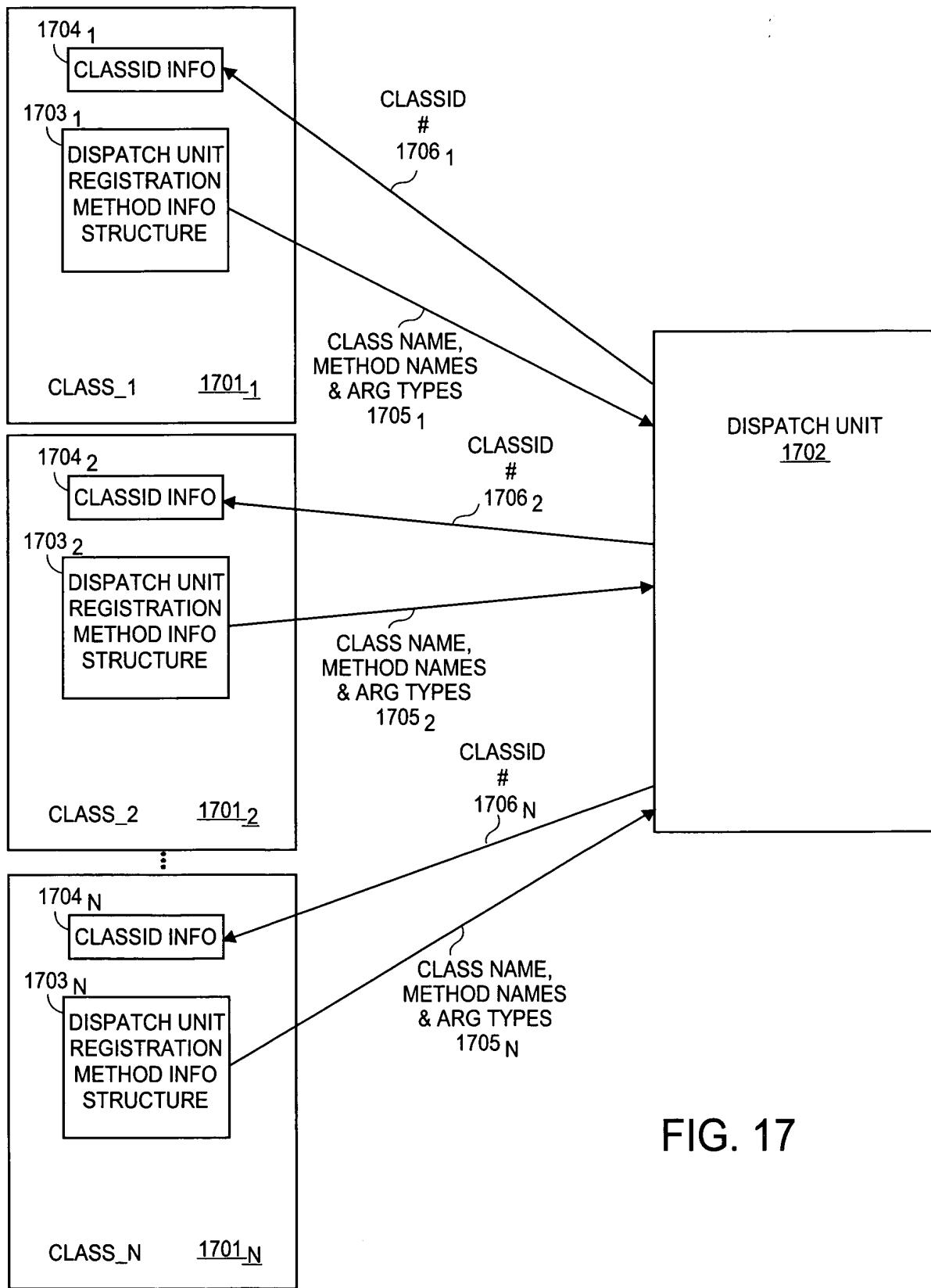


FIG. 17

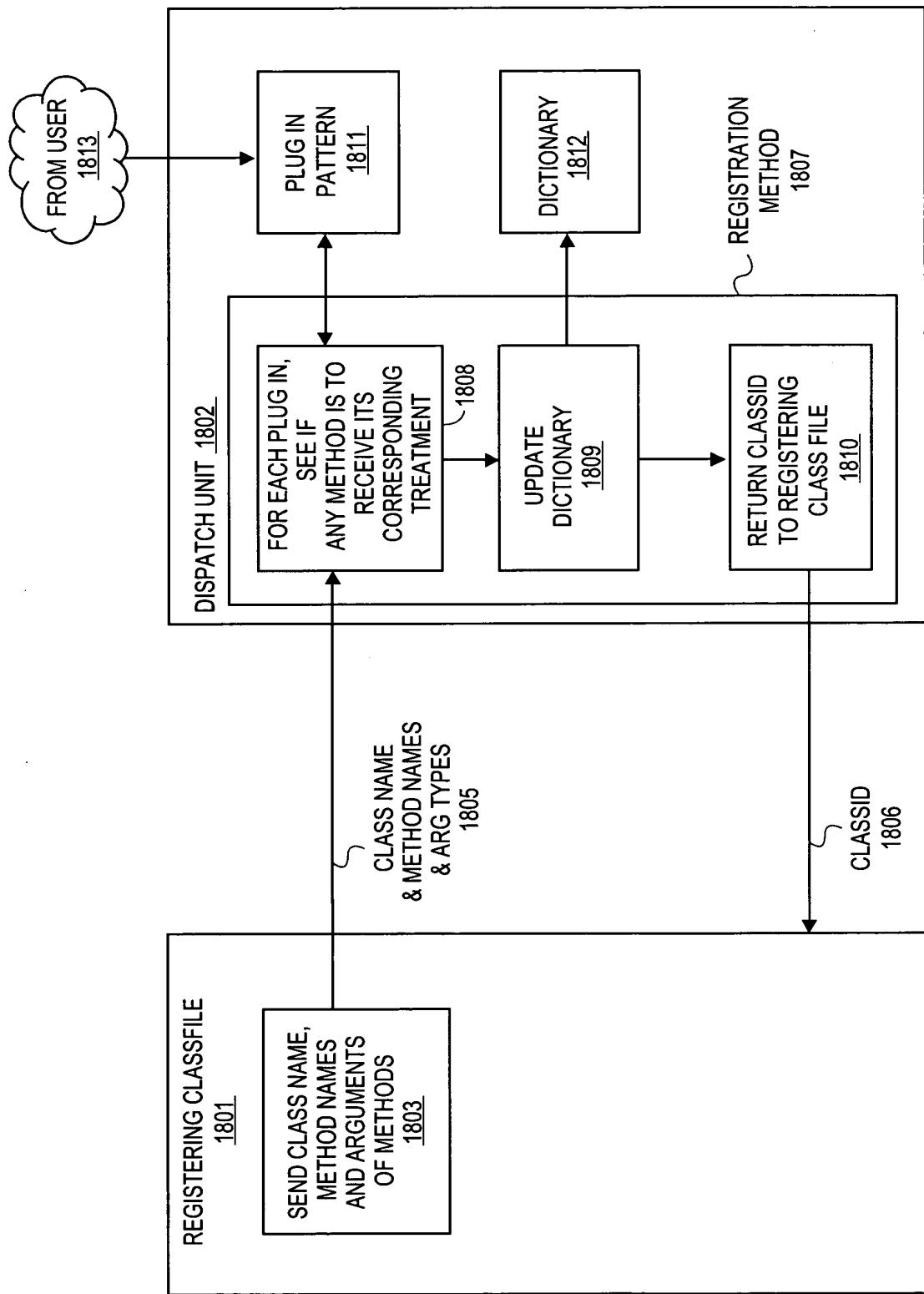


FIG. 18

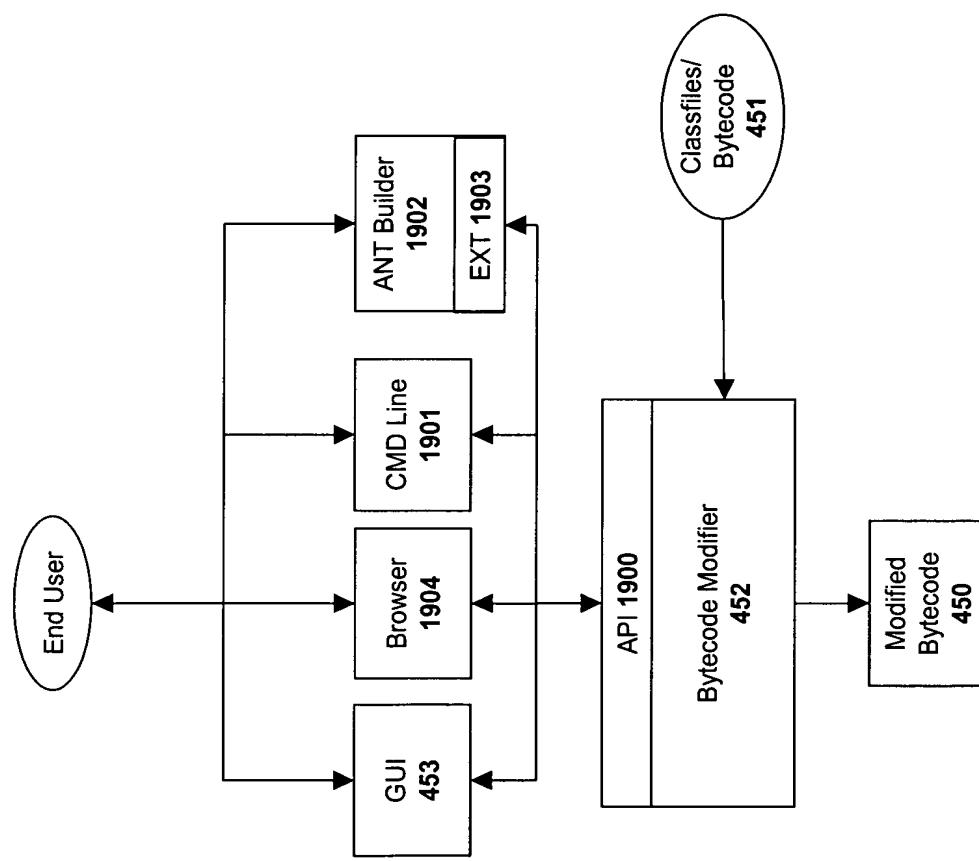
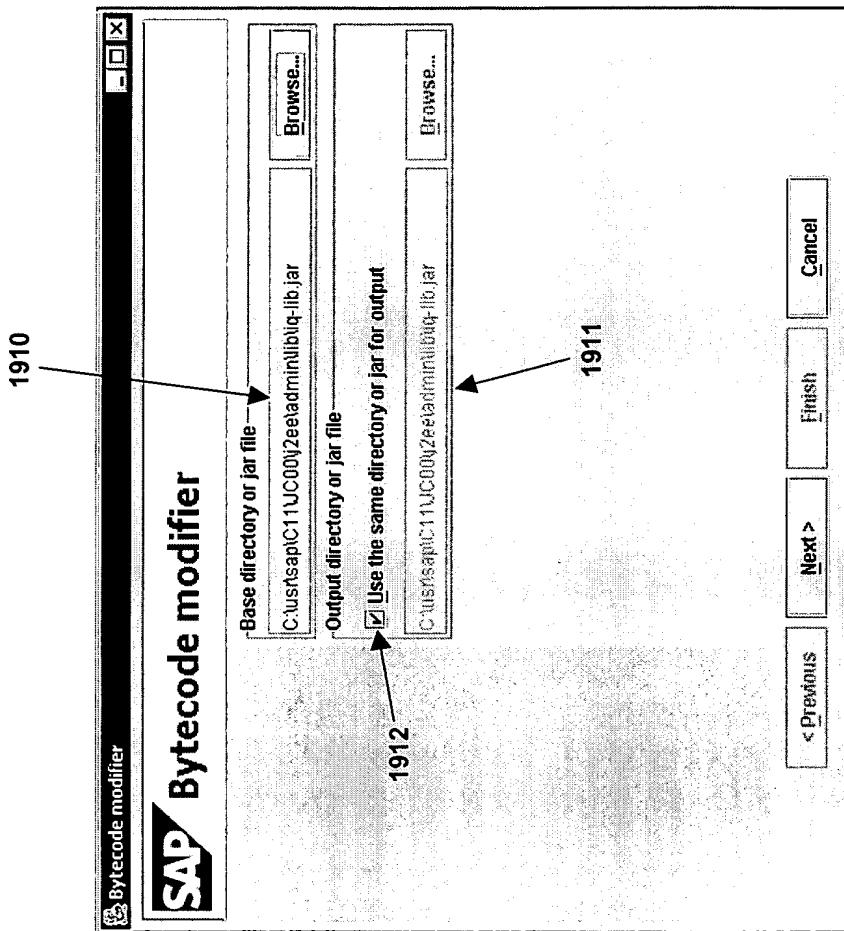


FIG. 19A

FIG. 19B



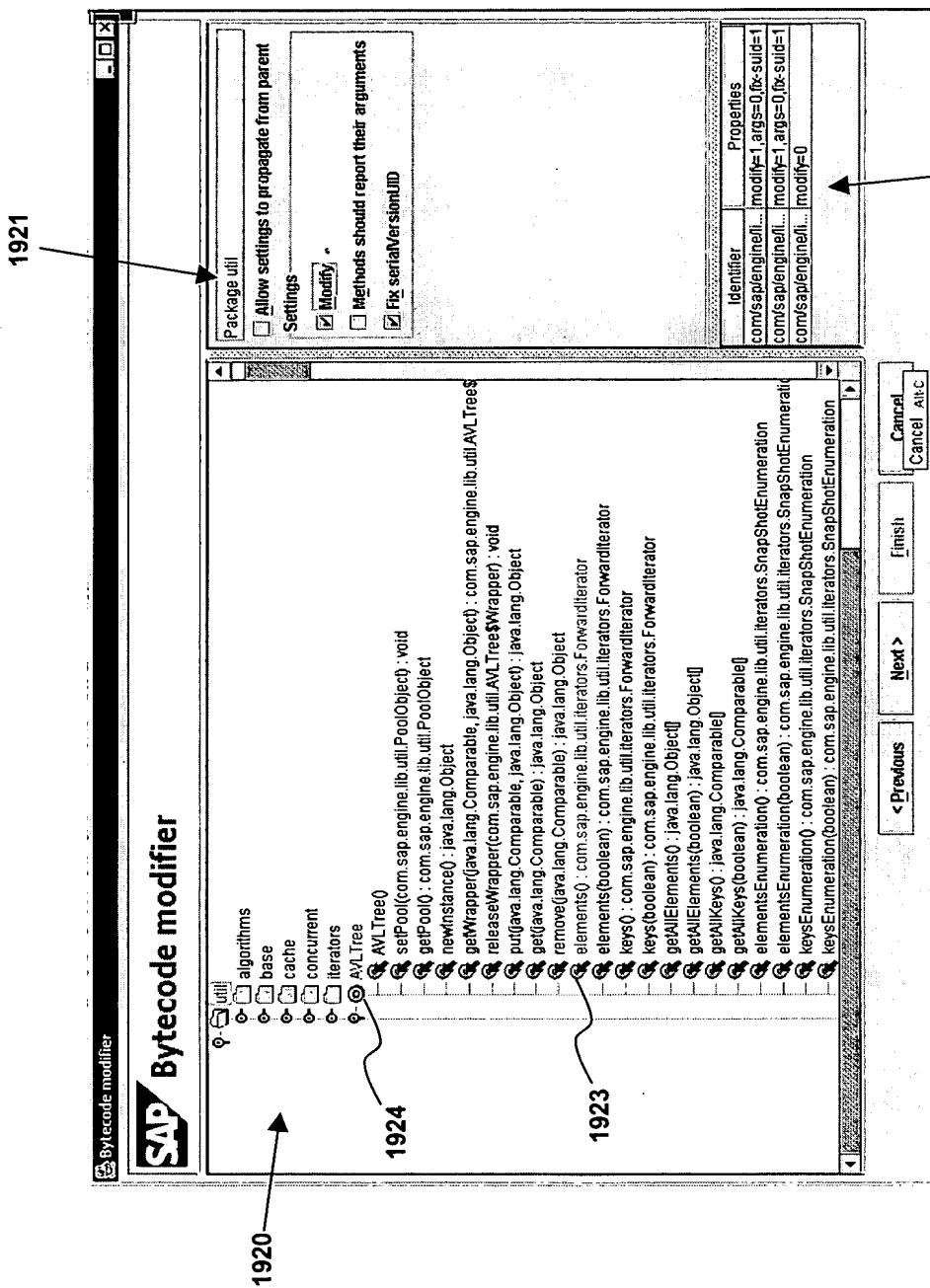


FIG. 19C

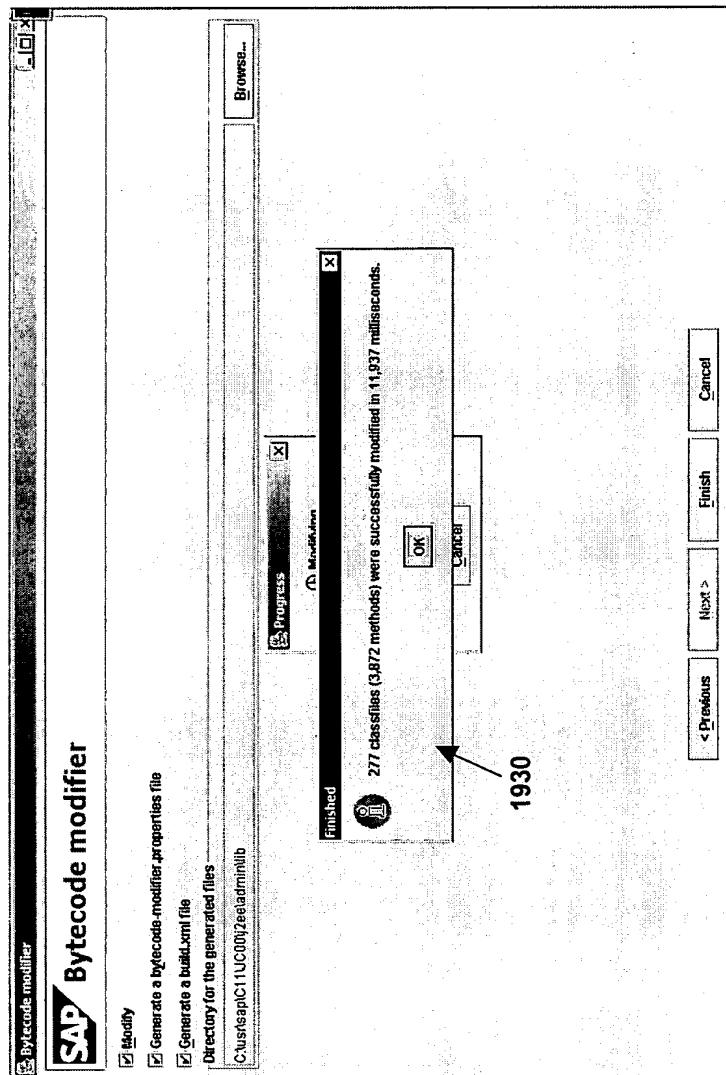


FIG. 19D

```

// Direct modification of a file
CFModifier modifier = new CFModifier();
modifier.modify("D:/temp/A.class", null);

```

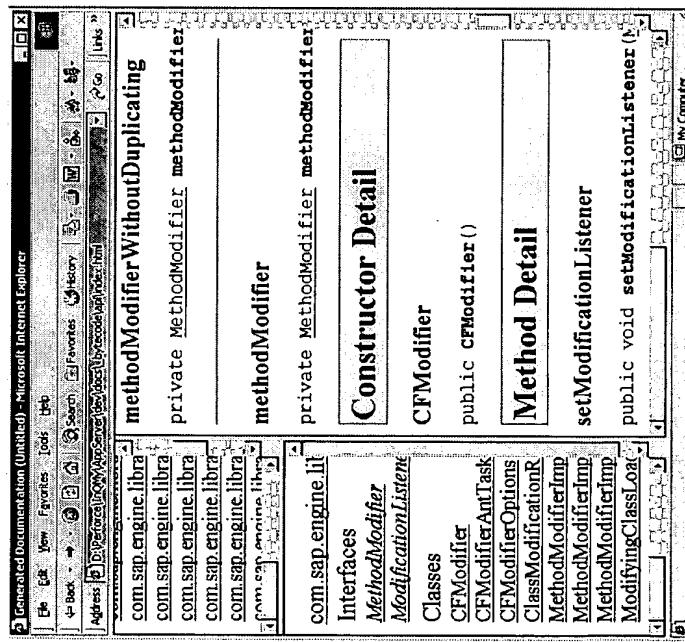


FIG. 19E

1940

Command Prompt

```
>java -classpath bytecode.jar com/sap/engine/library/bytocode/  
Usage:  
modify <conf-file> <input-file> [<output-file>]  
Runs the bytecode modifier.  
<conf-file> The configuration file for the m  
<input-file> A jar file or a directory.  
<output-file> A jar file or a directory. By de  
<input-file> and <output-file> must either be both jar  
1901
```

FIG. 19F

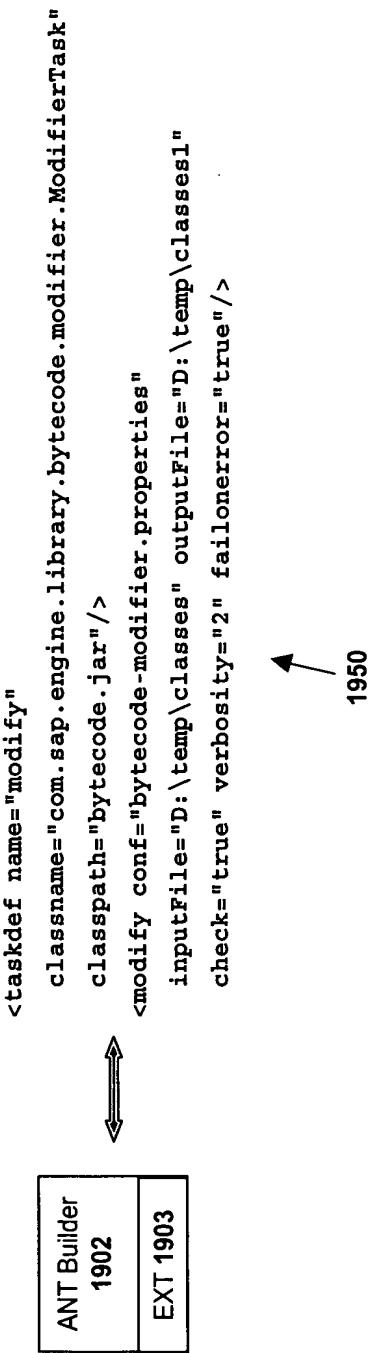


FIG. 19G